

**REMARKS**

Claims 1, 3-44 and 92-110 are pending in this application. Applicants acknowledge with appreciation the allowance of claims 4-9, 12-44 and 92-110.

The title of the application has been amended to more clearly describe the subject matter of the claimed invention.

Claims 1, 3 and 11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hu et al., *Characteristics of Trenched Coplanar Waveguide For SiMMIC Applications*, 1997 IEEE MTT-S Digest ("Hu") in view of Solon Spiegel et al., *Impact of Light Illumination and Passivation Layer on Silicon Finite-Ground Coplanar-Waveguide Transmission-Line Properties*, 2000 IEEE ("Spiegel"). This rejection is respectfully traversed.

Independent claim 1 recites a method of "forming a coplanar waveguide" by *inter alia* "depositing an insulating material on a substrate," "forming a signal conductor line over said insulating material" and "forming two longitudinal ground conductor planes over said substrate and on opposing sides of said signal conductor line, said ground conductor planes being spaced from said signal conductor line." Independent claim 1 also recites that "the acts of forming said signal conductor line and at least one of said ground conductor planes further comprise depositing a conductive material on top of said insulating layer." Independent claim 1 further recites "subsequently forming a trench in said substrate in an area between at least one of said ground conductor planes and said signal conductor line."

Hu relates to a "novel low loss trenched aluminum CPW (coplanar waveguide) transmission line structure, fabricated on a selection of high, medium and low resistivity silicon substrate materials." (Abstract). Hu teaches that "[b]y lowering

the dielectric constant of the substrate at the edges of the strip and ground conductors, current crowding at the edges can be reduced and hence conductor loss reduced.” (page 735).

Spiegel relates to the “[m]odeling of silicon finite-ground coplanar-waveguide (FGCPW) transmission lines.” (Abstract). According to Spiegel, “removing the passivation layer from the slot areas leads to a reduction of the surface charge” to form silicon FGCPW transmission lines. (page 1673-74).

The subject matter of claims 1, 3 and 11 would not have been obvious over Hu in view of Spiegel. Specifically, the Office Action fails to establish a *prima facie* case of obviousness. Courts have generally recognized that a showing of a *prima facie* case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must teach or suggest all claim limitations. See e.g., In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Rouffet, 149 F.3d 1350, 1355 (Fed. Cir. 1998); Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573 (Fed. Cir. 1996).

First, not all limitations of independent claim 1 are disclosed, taught or suggested by the prior art references, whether considered alone or in combination. Hu does not disclose, teaches or suggests “depositing an insulating material on a substrate,” much less “depositing an insulating material on a substrate,” “forming a signal conductor line over said insulating material” and “forming two longitudinal ground conductor planes over said substrate and on opposing sides of said signal conductor line,” as independent claim 1 recites. Hu analyses the dependence of RF

losses in CPW lines on silicon substrates having trenches of various depths, and not the steps of forming the coplanar waveguide of the claimed invention.

Similarly, Spiegel fails to disclose, teach or suggest the sequence of steps of independent claim 1. Spiegel is silent about “depositing an insulating material on a substrate,” “forming a signal conductor line over said insulating material,” “forming two longitudinal ground conductor planes over said substrate and on opposing sides of said signal conductor line” by “depositing a conductive material on top of said insulating layer,” and “subsequently forming a trench in said substrate in an area between at least one of said ground conductor planes and said signal conductor line,” as in the claimed invention. Spiegel teaches that a “1000-Å SiO<sub>2</sub> layer was thermally grown on the surface of a . . . silicon substrate” and that a “composite layer, i.e., Ni-Cr-Au . . . was then deposited on the surface of the oxide and covered with photo-resist.” (page 1675). Spiegel also teaches that “[following the definition of the exposed regions, a . . . galvanic gold metal was formed using electroplating techniques” so that “[f]inally, the SiO<sub>2</sub> layer was etched down using a buffered oxide etch.” (page 1675). Thus, Spiegel teaches only removing the SiO<sub>2</sub> layer from between adjacent structures, and not “forming a trench in said substrate in an area between at least one of said ground conductor planes and said signal conductor line,” as in the claimed invention.

Second, to establish a *prima facie* case of obviousness, “[i]t is insufficient that the prior art disclosed the components of the patented device, either separately or used in other combinations; there must be some teaching, suggestion, or incentive to make the combination made by the inventor.” Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934 (Fed. Cir. 1990). Thus, “the inquiry is not whether each element existed in the prior art, but whether the prior art made obvious the invention as a whole for which patentability is claimed.” Hartness Int’l, Inc. v. Simplimatic Engineering Co.,

819 F.2d 1100, 1108 (Fed. Cir. 1987). Accordingly, a determination of obviousness “must involve more than indiscriminately combining prior art; a motivation or suggestion to combine must exist.” Pro-Mold & Tool Co., 75 F.3d at 1573. This way, a rejection of a claim for obviousness in view of a combination of prior art references must be based on a showing of a suggestion, teaching, or motivation that has to be “clear and particular.” In re Dembiczak, 175 F.3d at 999. Thus, the mere fact that it is possible to find two isolated disclosures which might be combined to produce a new compound does not render such production obvious, unless the prior art also suggests the desirability of the proposed combination.

The March 23, 2005 Office Action fails to establish a *prima facie* case of obviousness because, as the Court in Northern Telecom, Inc. noted, “[i]t is insufficient that the prior art disclosed the components of the patented device” and there is no “teaching, suggestion, or incentive to make the combination.” Northern Telecom, Inc., 908 F.2d at 934. On one hand, the crux of Hu is the formation of CPW lines on silicon substrates having trenches of various depths to reduce the conductor loss. For this, Hu teaches the formation of 3 $\mu$ m, 6 $\mu$ m, 9 $\mu$ m, and 12 $\mu$ m deep trenches in a silicon substrate as part of aluminum CPW transmission lines.

On the other hand, the crux of Spiegel is the removal of a passivation layer between the metals lines and the substrate on which FGCPW transmission lines are formed, to avoid the formation of Schottky junctions. For this, Spiegel teaches the removal of portions of a SiO<sub>2</sub> layer to form a trench of only 0.1  $\mu$ m, which represents the thickness of the SiO<sub>2</sub> layer. Accordingly, a person of ordinary skill in the art would not have been motivated to combine Hu (which teaches the formation of 3 $\mu$ m, 6 $\mu$ m, 9 $\mu$ m, and 12 $\mu$ m deep trenches in a silicon substrate to form aluminum CPW transmission lines) with Spiegel (which teaches removal of SiO<sub>2</sub> layer to form trenches of only 0.1  $\mu$ m

to form gold CPW transmission lines). For at least these reasons, the Office Action fails to establish a *prima facie* case of obviousness, and withdrawal of the rejection of claims 1, 3 and 11 is respectfully requested.

Claim 10 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hu in view of Spiegel and further in view of Tran (U.S. Patent No. 6,259,407) ("Tran"). This rejection is respectfully traversed.

Claim 10 depends on independent claim 1 and recites that the "conductive material comprises copper."

Tran relates to a "uniplanar dual strip antenna that has a two dimensional structure." (Abstract). Tran teaches that "[t]he antenna is comprised of a first and a second metallic strip, each printed or etched on a thin planar substrate" and that "[t]he first and second strips are separated by a predetermined gap and are used as conductors of a two-wire transmission line." (Abstract). Tran also teaches that "[a] coplanar waveguide is coupled to the uniplanar dual strip antenna" and that "[t]he coplanar waveguide is constructed by printing or etching metal on the substrate." (Abstract).

None of the cited references, whether considered alone or in combination, discloses, teaches or suggests all limitations of claim 1. As noted above, Hu and Spiegel, considered alone or in combination, do not disclose, teach or suggest all the steps recited in claim 1. In addition, Tran teaches a uniplanar dual strip antenna having a two-dimensional structure, and not the steps recited in claim 1.

Applicants also submit that a person of ordinary skill in the art would not have been motivated to combine Hu and Spiegel with Tran to arrive at the claimed

invention. As noted above, Hu teaches the formation of 3 $\mu$ m, 6 $\mu$ m, 9 $\mu$ m, and 12 $\mu$ m deep trenches in a silicon substrate as part of aluminum CPW transmission lines, while Spiegel relates to the removal of a passivation layer (a SiO<sub>2</sub> layer) between the metals lines and the substrate form a trench of 0.1  $\mu$ m and to avoid the formation of Schottky junctions. The crux of Tran is "a new antenna structure and technique for manufacturing antennas . . . to achieve bandwidths more commensurate with advanced communication system demands." (Col. 2, lines 57-60). Tran emphasizes that "the antenna structure should be conducive to internal mounting to provide more flexible component positioning within the wireless device, greatly improved aesthetics, and decreased antenna damage." (Col. 2, lines 60-63). Accordingly, the only structure that Hu, Spiegel and Tran have in common is the substrate on which each of their elements are formed. Thus, a person of ordinary skill in the art would not have been motivated to combine these three disparate references, and withdrawal of the rejections of claim 10 is also respectfully requested.

Allowance of the application is solicited.

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